

PATENT APPLN. NO. 09/524,575
SUBMISSION UNDER 37 C.F.R. § 1.114

PATENT

IN THE CLAIMS:

1-6. (canceled)

7. (currently amended) A system for purification of exhaust gas from an internal combustion engine, consisting essentially of:
an in-line exhaust pipe;
an adsorbent zone comprising at least one adsorbent capable of adsorbing harmful substance in an exhaust gas and a catalyst zone comprising at least one catalyst containing a catalyst component capable of reducing said harmful substances, said adsorbent zone and said catalyst zone being positioned in the in-line exhaust pipe of the internal combustion engine with said adsorbent zone being upstream of said catalyst zone with respect to flow of said exhaust gas, in which system harmful substances in an exhaust gas during cold engine start up of the internal combustion engine are adsorbed by the adsorbent and the adsorbed harmful substances are desorbed from the adsorbent with a temperature rise of the adsorbent caused by the heat of the exhaust gas and are burnt on the catalyst, wherein the adsorbent contains, as a main adsorbent component, an H/ β -zeolite having an $\text{SiO}_2/\text{Al}_2\text{O}_3$ ratio of 100 or more 110 or more and further contains at least one noble metal selected from Pt, Pd and Rh as a catalyst component.

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8. (previously presented) A system according to claim 7,
wherein the noble metal is Pd.

9. (canceled)

10. (canceled)

11. (previously presented) A system according to claim 7,
wherein said at least one catalyst contains at least one noble
metal selected from Pt, Pd and Rh as the catalyst component.

12. (previously presented) A system according to claim 8,
wherein said at least one catalyst contains at least one noble
metal selected from Pt, Pd and Rh as the catalyst component.

13. (canceled)

14. (canceled)

15. (previously presented) A system according to claim 7,
wherein said noble metal contained in said at least one adsorbent
is loaded on a heat-resistant oxide.

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16. (canceled)

17. (previously presented) A system according to claim 11, wherein said noble metal contained in said at least one adsorbent is loaded on a heat-resistant oxide.

18. (canceled)

19. (previously presented) A system according to claim 7, wherein said at least one adsorbent is honeycomb shaped and has a hollow central portion at which honeycomb cells are absent, said hollow central portion extending in the direction of flow of exhaust gas so as to allow exhaust gas to flow through said hollow center portion.

20. (canceled)

21. (previously presented) A system according to claim 11, wherein said at least one adsorbent is honeycomb shaped and has a hollow central portion at which honeycomb cells are absent, said hollow central portion extending in the direction of flow of exhaust gas.

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22. (previously presented) A system according to claim 15, wherein said at least one adsorbent is honeycomb shaped and has a hollow central portion at which honeycomb cells are absent, said hollow central portion extending in the direction of flow of exhaust gas.

23-25. (canceled)

26. (currently amended) A system for purification of exhaust gas from an internal combustion engine, consisting essentially of: an in-line exhaust pipe; an adsorbent zone comprising at least one adsorbent capable of adsorbing harmful substance in an exhaust gas and a catalyst zone comprising at least one catalyst containing a catalyst component capable of reducing said harmful substances, said adsorbent zone and said catalyst zone being positioned in the in-line exhaust pipe of the internal combustion engine with said adsorbent zone being upstream of said catalyst zone with respect to flow of said exhaust gas, in which system harmful substances in an exhaust gas during cold engine start up of the internal combustion engine are adsorbed by the adsorbent and the adsorbed harmful substances are desorbed from the adsorbent with a temperature rise of the adsorbent caused

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by the heat of the exhaust gas and are burnt on the catalyst, wherein the adsorbent contains, as a main adsorbent component, an H/ β -zeolite having an $\text{SiO}_2/\text{Al}_2\text{O}_3$, $\text{SiO}_2/\text{Al}_2\text{O}_3$ ratio of ~~100 or more~~ 110 or more, and said adsorbent has a honeycomb shape with a hollow central portion at which honeycomb cells are absent, said hollow central portion extending in the direction of flow of exhaust gas.

27-28. (canceled)

29. (previously presented) A system for purification of exhaust gas from an internal combustion engine, consisting essentially of:

an in-line exhaust pipe;
an adsorbent zone comprising at least one adsorbent capable of adsorbing harmful substance in an exhaust gas and a catalyst zone comprising at least one catalyst containing a catalyst component capable of reducing said harmful substances, said adsorbent zone and said catalyst zone being positioned in the in-line exhaust pipe of the internal combustion engine with said adsorbent zone being upstream of said catalyst zone with respect to flow of said exhaust gas, in which system harmful substances in an exhaust gas during cold engine start up of the internal combustion engine are adsorbed

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by the adsorbent and the adsorbed harmful substances are desorbed from the adsorbent with a temperature rise of the adsorbent caused by the heat of the exhaust gas and are burnt on the catalyst, wherein the adsorbent contains, as a main adsorbent component, an H/ β -zeolite having an $\text{SiO}_2/\text{Al}_2\text{O}_3$, $\text{SiO}_2/\text{Al}_2\text{O}_3$ ratio of 200 or more and further contains at least one noble metal selected from Pt, Pd and Rh as a catalyst component.

30. (previously presented) A system according to claim 29, wherein the noble metal is Pd.